



RECEIVED IN THE U.S. PATENT AND TRADEMARK OFFICE

INVENTOR(S): Hirotoshi KUBO et al.
SERIAL NO.: 10/016,142
FILING DATE: December 17, 2001
**TITLE: SEMICONDUCTOR DEVICE
AND MANUFACTURING
METHOD THEREOF**

**ATTORNEY DOCKET:
49232-20026.00**

Papers enclosed herewith:

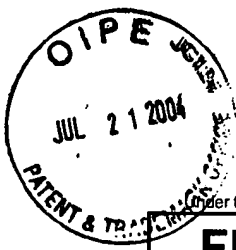
- 1) Request for Continued Examination (RCE) Transmittal
- 2) Fee Transmittal
- 3) Petition for Extension of Time (one months)
- 4) Information Disclosure Statement
- 5) Copy of Office Action issued in US Appln No. 09/919,797
- 6) Form PTO 1449 with three (3) references

Via: Courier

Initials: BEB/TF/nej

Date filed: July 21, 2004

wa-69452



2812 ✓

PTO/SB/17 (10-03)

Approved for use through 7/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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**FEE TRANSMITTAL
for FY 2004**

Effective 10/01/2003. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27**TOTAL AMOUNT OF PAYMENT** (\$) 880.00**Complete if Known**

| | |
|----------------------|-----------------------|
| Application Number | 10/016,142 |
| Filing Date | December 17, 2001 |
| First Named Inventor | Hirotooshi KUBO |
| Examiner Name | Christopher W. Lattin |
| Art Unit | 2812 |
| Attorney Docket No. | 492322002600 |

METHOD OF PAYMENT (check all that apply)☐ Check ☐ Credit Card ☐ Money Order ☐ Other ☐ None☒ Deposit Account:

Deposit Account Number 03-1952

Deposit Account Name Morrison & Foerster LLP

The Director is authorized to: (check all that apply)

☒ Charge fee(s) indicated below ☒ Credit any overpayments☒ Charge any additional fee(s) or any underpayment of fee(s)☐ Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.**FEE CALCULATION (continued)****3. ADDITIONAL FEES**

| Large Entity | | Small Entity | | Fee Description | Fee Paid |
|--------------|----------|--------------|----------|--|----------|
| Fee Code | Fee (\$) | Fee Code | Fee (\$) | | |
| 1051 | 130 | 2051 | 65 | Surcharge - late filing fee or oath | |
| 1052 | 50 | 2052 | 25 | Surcharge - late provisional filing fee or cover sheet | |
| 1053 | 130 | 1053 | 130 | Non-English specification | |
| 1812 | 2,520 | 1812 | 2,520 | For filing a request for <i>ex parte</i> reexamination | |
| 1804 | 920* | 1804 | 920* | Requesting publication of SIR prior to Examiner action | |
| 1805 | 1,840* | 1805 | 1,840* | Requesting publication of SIR after Examiner action | |
| 1251 | 110 | 2251 | 55 | Extension for reply within first month | 110.00 |
| 1252 | 420 | 2252 | 210 | Extension for reply within second month | |
| 1253 | 950 | 2253 | 475 | Extension for reply within third month | |
| 1254 | 1,480 | 2254 | 740 | Extension for reply within fourth month | |
| 1255 | 2,010 | 2255 | 1,005 | Extension for reply within fifth month | |
| 1401 | 330 | 2401 | 165 | Notice of Appeal | |
| 1402 | 330 | 2402 | 165 | Filing a brief in support of an appeal | |
| 1403 | 290 | 2403 | 145 | Request for oral hearing | |
| 1451 | 1,510 | 1451 | 1,510 | Petition to institute a public use proceeding | |
| 1452 | 110 | 2452 | 55 | Petition to revive - unavoidable | |
| 1453 | 1,330 | 2453 | 665 | Petition to revive - unintentional | |
| 1501 | 1,330 | 2501 | 665 | Utility issue fee (or reissue) | |
| 1502 | 480 | 2502 | 240 | Design issue fee | |
| 1503 | 640 | 2503 | 320 | Plant issue fee | |
| 1460 | 130 | 1460 | 130 | Petitions to the Commissioner | |
| 1807 | 50 | 1807 | 50 | Processing fee under 37 CFR 1.17(q) | |
| 1806 | 180 | 1806 | 180 | Submission of Information Disclosure Stmt | |
| 8021 | 40 | 8021 | 40 | Recording each patent assignment per property (times number of properties) | |
| 1809 | 770 | 2809 | 385 | Filing a submission after final rejection (37 CFR 1.129(a)) | |
| 1810 | 770 | 2810 | 385 | For each additional invention to be examined (37 CFR 1.129(b)) | |
| 1801 | 770 | 2801 | 385 | Request for Continued Examination (RCE) | 770.00 |
| 1802 | 900 | 1802 | 900 | Request for expedited examination of a design application | |

Other fee (specify)

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$) 880.00**FEE CALCULATION****1. BASIC FILING FEE**

| Large Entity | | Small Entity | | Fee Description | Fee Paid |
|--------------|----------|--------------|----------|------------------------|----------|
| Fee Code | Fee (\$) | Fee Code | Fee (\$) | | |
| 1001 | 770 | 2001 | 385 | Utility filing fee | |
| 1002 | 340 | 2002 | 170 | Design filing fee | |
| 1003 | 530 | 2003 | 265 | Plant filing fee | |
| 1004 | 770 | 2004 | 385 | Reissue filing fee | |
| 1005 | 160 | 2005 | 80 | Provisional filing fee | |

SUBTOTAL (1) (\$) 0.00**2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE**

| Total Claims | | Extra Claims | | Fee from below | | Fee Paid | |
|--------------------|------|--------------|---|----------------|---|----------|---|
| | ** = | | x | | = | | = |
| Independent Claims | | | | | | | |
| Multiple Dependent | | | | | | | |

| Large Entity | | Small Entity | | Fee Description |
|--------------|----------|--------------|----------|--|
| Fee Code | Fee (\$) | Fee Code | Fee (\$) | |
| 1202 | 18 | 2202 | 9 | Claims in excess of 20 |
| 1201 | 86 | 2201 | 43 | Independent claims in excess of 3 |
| 1203 | 290 | 2203 | 145 | Multiple dependent claim, if not paid |
| 1204 | 86 | 2204 | 43 | ** Reissue independent claims over original patent |
| 1205 | 18 | 2205 | 9 | ** Reissue claims in excess of 20 and over original patent |

SUBTOTAL (2) (\$) 0.00

** or number previously paid, if greater; For Reissues, see above

SUBMITTED BY

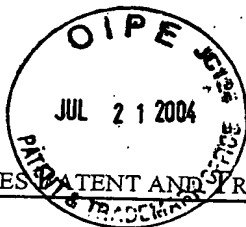
(Complete if applicable)

| | | | | | |
|-------------------|------------------------|-----------------------------------|---------------|-----------|----------------|
| Name (Print/Type) | Barry E. Bretschneider | Registration No. (Attorney/Agent) | 28,055 | Telephone | (703) 760-7743 |
| Signature | | Date | July 21, 2004 | | |

I hereby certify that this correspondence is being hand delivered to: Customer Window, MS RCE, U.S. Patent and Trademark Office, 220 20th Street S., Crystal Plaza Two, Lobby Room 1B03, Arlington, Virginia 22202, on the date shown below.

Dated: July 21, 2004

Signature: (Nadine Johnson)



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|------------------------------|------------------|
| 09/919,797 | 08/02/2001 | Hirotsoshi Kubo | 2001-1101 | 4860 |
| 513 7590 12/15/2003 WENDEROTH, LIND & PONACK, L.L.P. 2033 K STREET N. W. SUITE 800 WASHINGTON, DC 20006-1021 | | | | |
| | | | EXAMINER VOCKRODT, JEFF B | |
| | | | ART UNIT 2822 | PAPER NUMBER |

DATE MAILED: 12/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

RECEIVED
DEC 17 2003
WENDEROTH, LIND & PONACK

Office Action Summary

Application No.

09/919,797

Applicant(s)

KUBO, HIROTOSHI

Examiner

Jeff Vockrodt

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,4 and 6-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,4 and 6-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

This office action is in response to the amendment filed on September 30, 2003. Claims 1, 3-4, and 6-17 are pending.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3-4, 8-13, 16-17 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Pat. No. 5,340,753 ("Bassous").

Claim 1 reads on Bassous as follows: A method of manufacturing a semiconductor device, comprising:

forming a collector layer (56) of a first conductivity type;

forming a base region (22, 24, 26) of a second conductivity type on a top surface of said collector layer of said first conductivity type, said first conductivity type being opposite said second conductivity type, said base region being formed using epitaxial growth technology (¶¶ bridging cols. 3-4), and being formed as a single region having a uniform impurity concentration with respect to a width direction of the base region (the impurity concentration is uniform in the width direction);

forming a groove (emitter window 34) in a top surface of said base region (22, 24, 26) at a portion thereof;

forming spacers (44) on sidewalls of said groove;

forming a diffusion source film (46) in said bottom of said groove to be embedded therein between said spacers (44); and

forming an emitter region (48) of said first conductivity type in said base region at a bottom surface of said groove, said emitter region being formed in said top surface of said base region at a bottom of said diffusion source film between said spacers (Fig. 10).

Claims 3, 8. The emitter is out diffused from the N+ polysilicon diffusion source film (46). (col. 5, ll. 4-16).

Claims 4 and 13. The base region has a flat bottom (Fig. 10).

Claims 9-12 and 16-17. Bassous teaches forming the base region using in-situ doped epitaxial growth of silicon (§ bridging cols. 3-4)

Claim 12. Bassous teaches forming the base region using in-situ doped epitaxial growth of silicon (§ bridging cols. 3-4)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6-7 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bassous in view of U.S. Pat. No. 4,731,341 ("Kawakatsu").

Claims 6-7 and 14-15 differ from Bassous by forming an emitter electrode on the surface of the diffusion source film. Claims 7 and 15 differ from Bassous by forming the base and

emitter electrodes of aluminum. Bassous merely teaches a doped polysilicon diffusion source film (46) that serves as the emitter electrode.

Kawakatsu teaches forming a bipolar transistor utilizing an arsenic doped polysilicon emitter contact layer 116 from which the emitter dopants are diffused and an aluminum emitter electrode 116. (Kawakatsu, col. 4, ll. 50-60).

Bassous and Kawakatsu are analogous art. They are within the field of bipolar transistors and particularly teach forming diffused emitters.

Further forming an aluminum electrode onto the emitter electrode (46) of Bassous would have been obvious to one of ordinary skill in the art at the time of the invention. A person having ordinary skill in the art would have been motivated to form an aluminum electrode in addition to the emitter electrode of Bassous to facilitate improved electrical contact to the emitter as suggested by Kawakatsu.

Response to Arguments

Applicant's arguments with respect to claims 1, 3-4, and 6-17 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Pat. No. 6,239,477 ("Johnson"). Johnson teaches an in-situ doped epitaxial base region (48, 52).

Any inquiry concerning communications from the examiner should be directed to Jeff Vockrodt at (703) 306-9144 who can be reached on weekdays from 9:30 am to 5:00 pm EST. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian, can be reached at (703) 308-4905.

Application/Control Number: 09/919,797

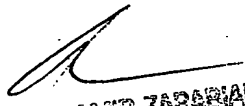
Art Unit: 2822

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The fax number for this group is 703-872-9306. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist at (703) 308-0956.

December 3, 2003

J. Vockrodt



AMIR ZAREBIAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2000

Notice of References Cited

Application/Control No.

09/919,797

Applicant(s)/Patent Under
Reexamination
KUBO, HIROTOSHI

Examiner

Jeff Vockrodt

Art Unit

2822

Page 1 of 1

U.S. PATENT DOCUMENTS

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Name | Classification |
|---|---|--|-----------------|-------------------|----------------|
| | A | US-5,340,753 | 08-1994 | Bassous et al. | 438/366 |
| | B | US-6,239,477 | 05-2001 | Johnson, F. Scott | 257/592 |
| * | C | US-4,997,775 | 03-1991 | Cook et al. | 438/322 |
| * | D | US-4,731,341 | 03-1988 | Kawakatsu, Akira | 438/366 |
| | E | US- | | | |
| | F | US- | | | |
| | G | US- | | | |
| | H | US- | | | |
| | I | US- | | | |
| | J | US- | | | |
| | K | US- | | | |
| | L | US- | | | |
| | M | US- | | | |

FOREIGN PATENT DOCUMENTS

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Country | Name | Classification |
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| | N | | | | | |
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NON-PATENT DOCUMENTS

| * | | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|---|
| | U | |
| | V | |
| | W | |
| | X | |

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.